ANALYSIS OF PROFILED STEEL SHEET DRY BOARD WALL PANEL WITH VARIATION IN WINDOW OPENING SIZES

by

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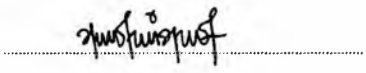
DECLARATION

I, **SHAFINA BINTI MOHAMED, 2002329635** confirm that the work is my own and that appropriate credit has been given where reference has been made to the work of others.



ABSTRACT

The rapid development of science and technology has led to the introduction of using new construction techniques and materials in construction industry. One of the innovative composite constructions is Profiled Steel Sheet Dry Board (PSSDB) system.

This study presents the research of Profiled Steel Sheet Dry Board (PSSDB) as a wall panel with variation in window opening sizes. The work is an extension of previous research works by various researchers on PSSDB system. They are Wright H. D., Evans H. R., Wan Hamidon Wan Badaruzzaman, Benayoune Abdelghani, Siti Hawa Hamzah and many more.

The analytical investigation is to predict the behavior of PSSDB wall panels using finite element software; LUSAS 13.5. LUSAS pre-processing options provide on-screen modeling in standard Microsoft Windows environment.

PSSDB is a composite system, which classified into macro composite system comprises of profiled steel sheet, cemboard and connectors. This system is a form of double-skin composite panel. It consist of 2 layers of cemboard as the dryboard with thickness of 12 mm on the surface with Bondek II with 1.00 mm thickness as the profiled steel sheet forming at the middle core, via self-drilling and self-tapping screws spaced at 200 mm centre to centre vertically. The wall panel modelled using 3D thin shell elements for the profiled steel sheet and cemboard. In this study, the opening varies to a size of 1400 mm

X 1400 mm with opening of 21.8%, 1600 mm X 1600 mm with opening of 28.4%, 1800 mm X 1800 mm with opening of 36.0% and 2000 mm X 2000 mm with opening of 44.4% of area of PSSDB wall panel. The support is set to be fully fixed at the lower end and lateral fix on the top side to prevent the panel from bending laterally at the top and prevent any rotation occur. The models are tested by applying 150 kN/m global distributed load. This value is chosen based on experimental maximum load testing.

From result analysis, the stress – strain pattern and deflection occured at the upper portion of the window opening and propagated at the top of the opening. The displacement in y-direction occured at node 3858 with value of 102.32 mm at rear cemboard component. The maximum stress occured at profiled steel sheet at node 917 with value of 56840 N/mm^2. The maximum strain occured at node 917 with value of 0.2686.

The proposed of this system as a load bearing wall give more advantages in building construction. It is a lightweight structure, easy to fabricate and save a lot of time for installation work.

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